

Rocky Flats Environmental Technology Site

# BACKLOG WASTE REASSESSMENT BASELINE BOOK

WASTE FORM 6  
POND CONCRETE

Prepared for.

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Reviewing

Official.

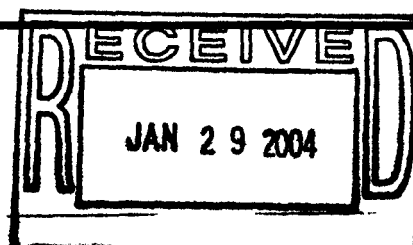
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Form	Rev	ECF	Proposed Modification
10	11	12	13
			1 Update Subpopulation 6C and Table 2-2. See Attachment 1
			2. Remove the EPA Waste Code D011, add CCC code PC, and update WEMS/container paperwork for the below listed containers See Attachment 2.
			D79421 D79426 D79429
			D79422 D79427 D79430
			D79425 D79428

⑩ The above listed containers are assigned to Subpopulation 6C. Subpopulation 6C includes EPA Waste Code D011. However, it is Rocky Flats policy not to assign characteristic EPA Waste Codes to a listed waste where the treatment standards for the listed waste addresses the characteristic, D011 will be removed from the Cemented Miscellaneous Sludge subpopulation

Requestor/SME	Signature	Date	Signature	Date	Signature
15	16	17	18	19	20
Requestor/SME	Steve Schafer	5/5/00			

⑮ Approval Authority: Pam Edrich 5/8/00  
Print Sign Date

INFORMATION  
ONLY

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## ACRONYMS

BWR	Backlog Waste Reassessment
DOE	U S Department of Energy
EPA	U S. Environmental Protection Agency
IDC	Item Description Code
ITS	Interceptor Trench System
LDR	Land Disposal Restrictions
mg/l	milligrams per liter
PA	Protected Area
PC	Pondcrete
PVC	polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
RFETS	Rocky Flats Environmental Technology Site
WEMS	Waste and Environmental Management System
WSRIC	Waste Stream and Residue Identification and Characterization

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## **1.0 INTRODUCTION**

### **1.1 Backlog Waste Reassessment (BWR) Project Purpose**

The primary purpose of this project is to compile all existing waste characterization information for the stored inventory of wastes at the U S Department of Energy (DOE) Rocky Flats Environmental Technology Site (RFETS) and to conduct a reassessment of that information to recommend and document the correct characterization for all waste

The BWR project will provide documentation for the reassessed waste characterizations as well as a central file location for all waste characterization information. In addition, container labels will be corrected with the most up-to-date information possible, while the Waste and Environmental Management System (WEMS) computer database for all containers will be revised to reflect the U S Environmental Protection Agency (EPA) codes agreed to during the course of the BWR project

Radioactive wastes and residues have historically been characterized on an Item Description Code (IDC) basis until the implementation of the Waste/Residue Traveler with the Waste Stream and Residue Identification and Characterization (WSRIC) program. The hazardous waste determination within the Protected Area (PA) was principally made at the drum or crate counter prior to the traveler system. The characterization for the IDC was supplied to the assay personnel by Waste Operations or Waste Programs. The hazardous waste determination was made based on the assay results (such as above-discard, transuranic, low-level) and the characterization documentation provided by Waste Operations or Waste Programs. Non-PA wastes were characterized either by the generator or by documentation from Waste Operations or Waste Programs.

In most cases, past hazardous waste determinations were very conservative. Because the characterizations were performed on an IDC-wide basis, IDCs that were variable in composition and generation were assigned extra EPA codes. At times, listed EPA codes were assigned based on the presence of the constituent rather than the use of the constituent. Also, codes were assigned that are not possible based on the physical forms of the waste, such as EPA Code D002 for a solid. In some cases, additional characterization information was compiled that would revise the original characterization.

During the hazardous waste determination and reassessment characterization phase of the project, the WEMS database was first queried to identify the waste containers constituting the waste form IDC 805 population. The information gained from the WEMS query provided the basis for subpopulation identification. Generator and custodian contacts for this waste form are presented in Section 3.0. References used during the continuing identification of waste form subpopulations are listed in Section 4.0.

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## **2.0 BACKLOG WASTE CHARACTERIZATION**

### **2.1 Background Information for Pondcrete (Item Description Code 805)**

Pondcrete (PC) is cemented sludge from Solar Evaporation Pond 207A. This waste was generated at the Pondcrete Facility in Building 788. There are around sixty-six hundred containers in inventory stored at the Rocky Flats Environmental Technology Site on the 750 and 904 Pads. The earliest generation date for the inventory is July 1985. Pondcrete generation stopped in August 1989. Some of the pondcrete blocks did not solidify properly and failed to pass free liquid or penetrometer tests (Weston 1991). Some of these blocks have been reprocessed, repackaged, or both since August 1989.

### **2.2 Description of Generating Process**

Remediation of the Solar Evaporation Pond 207A began in June 1985 (Rockwell 1988). The clear water on top of the pond sludge was pumped to Building 374 for treatment. The remaining sludge was then slurried and pumped to the Building 788 clarifier (EG&G 1993a).

The Building 788 clarifier is a 25-foot-diameter tank located between Pond 207A and Pond 207C (Halliburton 1992b). Pond 207A sludge was partially dewatered in the clarifier without the addition of chemicals. After settling had occurred, the supernatant was returned to the pond without a final solids separation. The thickened sludge was pumped to a pug mill.

In the pug mill, measured amounts of Type I Portland cement were added to the sludge and mixed to a desired consistency using paddles attached to the auger shaft. The basic pondcrete formula consisted of using a water-to-cement ratio of 1.5-to-1. The input sludge waste stream was expected to be 20 percent solids by weight. However, the process controls were not calibrated and waste loading varied.

The mixture was fed through a chute into triwalls (three-walled cardboard containers with a top and a bottom) lined with polyvinyl chloride (PVC). The pondcrete was allowed to cure before a lid was placed on the container (EG&G 1993b). Some of the triwalls containing pondcrete that failed to solidify properly were repackaged into half-crates and metal containers when the blocks of pondcrete began to fail. A flow schematic of the pondcrete generation process is presented in Figure 2-1.

Efforts were made to reprocess pondcrete that did not solidify properly. During the summer of 1989, triwalls containing the pondcrete were reprocessed at Building 788. The triwalls were cut open and the moist pondcrete dropped into a Morgan pumper. Larger clumps of solids were sprayed with water and broken up with shovels into smaller pieces to accommodate the pumper. The wet material was pumped to a mixer where Type I Portland cement and water were added. The mixture was fed into plywood boxes lined with cardboard and PVC. After curing, a lid was placed on the container. Two plywood boxes of pondcrete were generated during the reprocessing activities at Building 788.

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Between June 1990 and January 1991, additional failed pondcrete blocks were reprocessed on the 904 Pad. The failed pondcrete was recemented in the same manner as the pondcrete reprocessed in 1989. However, the mixture containing cement, water, and failed pondcrete was fed into triwalls rather than plywood boxes. The triwalls were lined with plastic liners. Reprocessing at the 904 Pad was done on a larger scale and generated about eighty triwalls. Following this reprocessing activity, gravel, cement and water were added to the cement mixer to clean out any residual sludge. This mixture was poured into 55-gallon drums and identified as IDC 805.

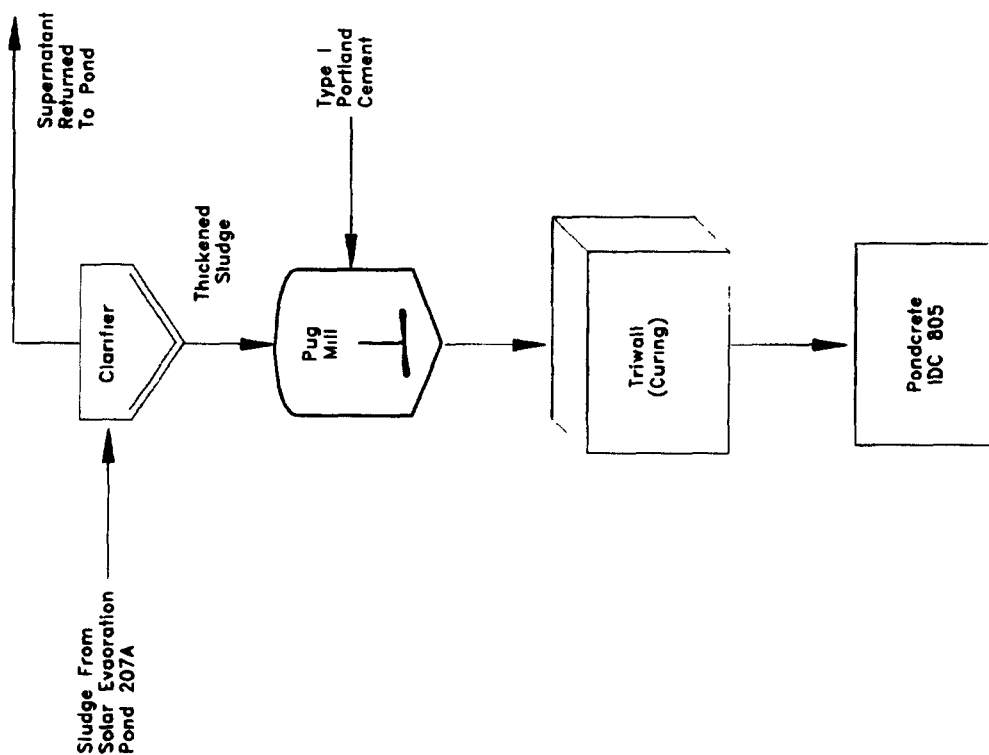


FIGURE 2 1

Rocky Flats Environmental Technology Site Backlog Waste Reassessment	BUILDING 788		PONDCRETE GENERATION PROCESS		Date	
	Task		By			
	Designed	P Edrich	Drawn	B Crawford	11/11/94	11/11/94
	Checked	P Edrich			11/11/94	11/11/94



### 2.3 Hazardous Waste Determination and Waste Characterization

Lined solar evaporation ponds were installed during construction of RFETS. Solar Pond 207A was placed in service in August 1956. The ponds were designed to impound and treat aqueous waste products discharged from the Building 774 Process Waste Treatment Facility. The waste contained high levels of chemical contaminants, such as fluoride, nitrates, and various metallic ions. Occasionally, untreated waste products were impounded and treated in the ponds. The wastes included metallic lithium, acids, sewage sludge, and plating residues (Wienand and Howard 1992).

In 1980, the Building 374 Liquid Waste Treatment Facility began receiving waste streams that were previously sent to the solar evaporation ponds. The ponds gradually received less wastewater until 1986, when they were no longer used (Rockwell 1989). The provided waste characterization is based on the assumption that the waste streams fed into Pond 207A were similar to those sent to Building 374.

Information contained in the November 1992 *WSRIC Valve Vaults Book* has been used to characterize waste streams that were pumped into Pond 207A (EG&G 1992). The Valve Vaults book describes the process waste sent to Building 374 for treatment. The book was used because it is the only reference that provides detailed characterization information on waste that was potentially sent to Pond 207A. Other references and interviews have been used to enhance or add to this information as it relates to the pondcrete waste form. The waste streams potentially received by Solar Evaporation Pond 207A, along with their associated EPA codes, are listed in Table 2-1.

Table 2-1 Waste Streams Potentially Received by Solar Evaporation Pond 207A

WASTE STREAMS			
Untreated Waste	Buildings 122, 123, 443, 444, and 447	Demineralization salts, water softeners, chemical indicators, electroplating wastes, acetone, acids, bases, beryllium, 1,1,2-trichloro-1,2,2-trifluoroethane, toluene, Trim Sol, penetrant oils, cadmium, chromium, lead, nickel, silver, ethylene glycol, Mariko, Oakite, diamond paste, spent emulsifier, spent developer, spent X-ray developer/starter	D002, D006, D007, D008, D011, F001, F002, F003, F005, F006, F007, F009
Water from Interceptor Trench System	Solar Evaporation Ponds	Solar Pond Water	F001, F002, F003, F005, F006, F007, F009

Treated Waste	700 and 800 Areas, Buildings 559 and 561	Contains acids, bases, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, selenium, silver, Trim Sol, Oakite Cleaner, Ox Out 536, listed solvents from stream 889- 1-3, acetone, ethyl alcohol, hexane, methanol, MEK, methylene chloride, eutectic salts, unknown constituents from sink wastewater, photo developer, and photo stop bath	D001, D002, D004, D005, D006, D007, D008, D009, D010, D011, F001, F002, F003, F005
Laundry Waste	Buildings 566 and 778	NONE	NONE
Halliburton Treatability Study	All Above Named Source Buildings	Silver Nitrate	D011

Extensive efforts have been made to accurately characterize the pondcrete waste form. Analytical results from the *Pondcrete Waste Characterization Report* (Halliburton 1992a) and the *Analysis Of Inventory Pondcrete Final Report* (Weston 1991) are considered in the characterization of the waste. Analytical information regarding pondcrete was not found in the WSRIC Sampling and Analysis Database (EG&G 1994). The WSRIC Building Books have been used to track EPA codes associated with waste streams entering the pondcrete generation process.

The cited codes apply to specific waste streams at their source, before impoundment in Pond 207A. These are the only EPA codes that could potentially be assigned to pondcrete waste. Some of these codes do not apply to the final waste form under EPA regulations.

A summary of the proposed characterization for the pondcrete waste form is presented in Table 2-2. The characterization rationale for the waste form follows:

**Table 2-2 Proposed Characterization for Pondcrete Population**

WASTE POPULATION	WASTE DESCRIPTION	WASTE QUANTITY	WASTE COMPOSITION	WASTE TREATMENT	WASTE STORAGE	WASTE DISPOSAL
6	A	805	F001, F002, F005, F006, F007, F009	Y	N/A	PC
6	B	805	F001, F002, F005, F006, F007, F009	Y	3A	PC
6	C	823	F001, F002, F005, F006, F007, F009	Y	N/A	PC

Acronyms	CC	Compatibility Code
	CCC	Chemical Constituent Code
	EPA	Environmental Protection Agency
	IDC	Item Description Code
	LDR	Land Disposal Restricted under 6 CCR 1007-3, Part 268 (N-No indicates the waste meets LDR treatment standards or is not regulated under Part 268. Y-Yes indicates the waste does not or may not meet LDR treatment standards)
	N/A	Not Applicable
	PC	Pondcrete

### 2.3.1 Population 6A

Wastewaters sent to Pond 207A exhibited the characteristics of ignitability (D001) and corrosivity (D002). However, the characteristic of ignitability (D001), as defined in 6 CCR 1007-3, Section 261.21, does not apply to this subpopulation of pondcrete because it is not a liquid, gas, or oxidizer. The characteristic of corrosivity (D002), as defined in 6 CCR 1007-3, Section 261.22, does not apply to this subpopulation of pondcrete because it is solid.

Wastewaters sent to Pond 207A were intermittently contaminated with Resource Conservation and Recovery Act (RCRA) metals (D004-D011). Under the derived-from rule, if a characteristic waste is treated, the final waste form is only a characteristic waste if it continues to exhibit a characteristic. Sampling and analysis of pondcrete, described in the *Pondcrete Waste Characterization Report*, found that the waste exceeded toxicity characteristic criteria for cadmium (D006) and chromium (D007) (Halliburton 1992a). However, since it is Rocky Flats policy not to assign characteristic EPA waste codes to a listed waste, where the treatment standards for the listed waste addresses the characteristic, D006 and D007 will not be assigned to Pondcrete. The Universal Treatment Standards for the underlying hazardous constituents address treatment of cadmium and chromium.

Toxicity characteristic limits, Land Disposal Restriction Universal Treatment Standards and analytical results from the Halliburton and Weston reports are presented in Table 2-3. The Weston data was reported as total metals and, for the purposes of this Table, has been divided by twenty for ease of comparison to the characteristic limits and Universal Treatment Standards. The collected data should be reviewed for their validity regarding EPA SW-846 (EPA 1990).

Table 2-3 Analytical Results Summary for Pondcrete

Characteristic Limits <sup>1</sup>	50	1000	10	50	50	0.2	N/A	10	50
Universal Treatment Standard <sup>1</sup>	50	76	0.19	0.86	0.37	0.025	5.0	0.16	0.30
Triwalls <sup>2</sup>	0.065	0.74	20.6	5.29	0.019	0.028	2.46	ND	0.011
Metal <sup>2</sup>	0.069	0.55	10.8	1.52	0.015	0.023	0.92	ND	ND
Triwalls <sup>3</sup>	0.29	-	136.0	74.4	11.2	0.52	23.8	-	4.18
Metal <sup>3</sup>	0.43	-	110.8	56.0	16.2	0.52	19.3	-	3.99

NOTES

- 1 mg/L TCLP
- 2 Halliburton Data
- 3 Weston data. Reported as total metals, the results shown are the totals results divided by twenty for comparison to limits reported as mg/L TCLP

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Based on the mixture rule and the derived-from rule, the pondcrete would continue to carry the listed EPA codes associated with wastewaters fed to Pond 207A until it is decontaminated or closed according to RCRA guidelines. Although the use of Pond 207A stopped in 1986, the pond was never decontaminated or closed according to RCRA guidelines. Additionally, all of the sludge that was treated to generate pondcrete was present in the pond before it stopped being used.

The EPA Codes F001, F002, and F005 are assigned to pondcrete because wastewaters sent to Pond 207A were contaminated with regulated spent solvents in the past. Sampling and analysis indicated that pondcrete stored in metal boxes exceeded F003 treatment standards for methanol. The TCLP concentration mean is 0.77 milligrams per liter (mg/l) and the treatment standard is 0.75 mg/l. Although the results indicated that pondcrete stored in triwalls met F003 LDR treatment standards, the waste will not be considered compliant until these results are verified for the entire population. The waste was below the LDR treatment standards for all other F001, F002, F003, and F005 constituents (Halliburton 1992a). The EPA Codes F006, F007, and F009 are assigned to pondcrete because wastewaters sent to Pond 207A were contaminated with wastes from electroplating operations in the past.

P- and U-listed EPA codes for discarded commercial chemical products will not be assigned to pondcrete. Excess chemicals are stored on the plant site. However, there is no documentation supporting P- and U-listed waste codes for specific chemicals that were impounded in Pond 207A.

#### Subpopulation 6B

This subpopulation includes containers holding materials generated from pondcrete and pond sludge sampling. These containers include 55-gallon drums overpacked into 85-gallon drums, 55-gallon poly drums and "X" type containers which can range from 500ml bottles to 30-gallon drums. This subpopulation does not include triwall or metal box containers. Based on conversations with Jeff Churchill, a Supervisor for Waste Solidification, these drums can be expected to contain free liquid. A review of available analytical data in the *Pondcrete Waste Characterization Report* (Halliburton 1992a) indicate that this free liquid will not exhibit the characteristics of ignitability as defined in 6 CCR 1007-3, Part 261.21(a)(1) or corrosivity as defined in 6 CCR 10007-3, Part 261.22(a)(1).

This subpopulation of pondcrete is assigned the listed codes F001, F002, F005, F006, F007, and F009 as explained in Subpopulation A.

#### Subpopulation 6C

This subpopulation includes containers listed as IDC 823, Cemented Miscellaneous Sludge, that were generated during April or May 1992. According to Jeff Churchill, these containers resulted from an earlier Halliburton Treatability Study in which silver nitrate was added to the Pondcrete. All of the containers have labelling indicating silver nitrate. Therefore, this subpopulation is assigned EPA Hazardous Waste Numbers F001, F002, F005, F006, F007, and F009.

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This subpopulation was once assigned IDC 805. However, because silver nitrate is not a usual contaminant of pondcrete/pondsludge, it was determined that the IDC of these containers should be changed to distinguish them from other IDC 805 waste. It is Rocky Flats policy not to assign characteristic EPA waste codes to a listed waste where the treatment standards for the listed waste addresses the characteristic. D011 will not be assigned to the Cemented Miscellaneous Sludge waste (DCF WF06-001-2000).

## **2.4 Waste Characterization Regulatory Discussion and Conclusion**

The pondcrete waste form was characterized in conformance with 6 CCR 1007-3, 40 CFR 260-280, and *U S DOE Definitions of Solid and Hazardous Waste* (DOE 1992). The following is a summary of the logic followed in determining the reassessment characterizations for the pondcrete.

- The material is not excluded from regulation as a solid waste under 6 CCR 1007-3, Section 261.2(e)(1)(ii), because it is not used or reused as an effective substitute for a commercial product; it is not a source, special nuclear, byproduct material, or certain secondary materials being reclaimed under 6 CCR 1007-3, Section 261.4(a)(4), and it is being discarded by being disposed of as provided in 6 CCR 1007-3. This material is a solid waste.
- The material is not excluded from regulation as a hazardous waste under 6 CCR 1007-3, Sections 261.4(b)(exclusions), 261.4(d)(RCRA sample), or 261.7(empty container). The material is not a recyclable material, as outlined in 6 CCR 1007-3, Section 261.6. The feed materials for the pondcrete generation process are mixed with wastes listed in 6 CCR 1007-3, Section 261, Subpart D. In addition, the material is derived from the treatment of a hazardous waste (6 CCR 1007-3, Section 261.3(c)(2)(i)).
- A petition for delisting this waste has not been filed and this waste has not been delisted, under 6 CCR 1007-3, Sections 260.20 and 260.22.
- The materials are also subject to LDR because they exceed treatment standards for several listed waste constituents under 6 CCR 1007-3, Part 268.

This waste is a RCRA-solid waste that is derived from the treatment of listed and characteristic wastes. The waste is not excluded from regulation, and it has not been delisted. There are no options for recycling this waste. The entire pondcrete population is subject to LDR. Therefore, this waste is determined to be a hazardous waste and is characterized as indicated in Section 2.3.

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### **3.0 CONTACT SUMMARY**

Generator and custodian interviews were conducted to obtain information regarding this waste form. A Reassessment Team meeting was held to discuss the preliminary reassessment. A list of contacts is given below

Jeff Churchill, 966-6071/D7511. Waste Solidification.

Leon Collins, 966-6968 Solar Ponds Projects

John Guadagnoli, 966-4885/D0776 Facility Management and Operations

Steve Keith, 966-8541/D0383. Solar Ponds Projects.

Kathy London, 966-8585/D3814. Solar Ponds Projects

Gregory Martinez, 966-5696 Waste Solidification (750 and 904 Pads).

Ron Teel, 966-6127/D3561 Building 374 Liquid Waste Treatment Operations

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#### 4.0 REFERENCES

Code of Colorado Regulations Title 6, Part 1007-3

Code of Federal Regulations Title 40, Parts 260-280

\_\_\_\_ Title 40, Part 268 *Land Disposal Restrictions*

DOE 1992 *U S DOE Definitions of Solid and Hazardous Waste*

EG&G Rocky Flats, Inc 1994 *Waste Stream and Residue Identification and Characterization Sampling and Analysis Database* Maintained by WASTREN, Inc

\_\_\_\_ 1993a *Annual Land Disposal Restriction Progress Report* Prepared by Waste Programs

\_\_\_\_ 1993b *Waste Stream and Residue Identification and Characterization, Building 788.*

\_\_\_\_ 1992 *Waste Stream and Residue Identification and Characterization, Building Valve Vaults*

EPA 1990 *Test Methods for Evaluating Solid Waste, SW-846* 3d ed

Halliburton NUS Environmental Corporation <sup>March</sup> 1992a *Pondcrete Waste Characterization Report*  
Rev 0 Prepared for EG&G Rocky Flats, Inc

\_\_\_\_ 1992b *Treatability Study Report and Process Formulation Report for 207C Pond and Clarifier* Rev 0

Rockwell International 1989 *Federal Facility Compliance Agreement Inventory Report*

\_\_\_\_ 1988 Letter from E R Naimon of Waste Operations to A. E. Whiteman of DOE, RFAO.  
August 29

Roy F Weston, Inc 1991 *Analysis of Inventory Pondcrete Final Report*

Wienand, Joe, and Steve Howard 1992 *Rocky Flats Solar Pond Program Lessons Learned*  
DOE Rocky Flats Office